

Backup Power for Voice Services in the Customer Premises

Performance Reliability Standards Workshop
Sponsored by the CPUC
San Francisco, CA
February 2, 2009

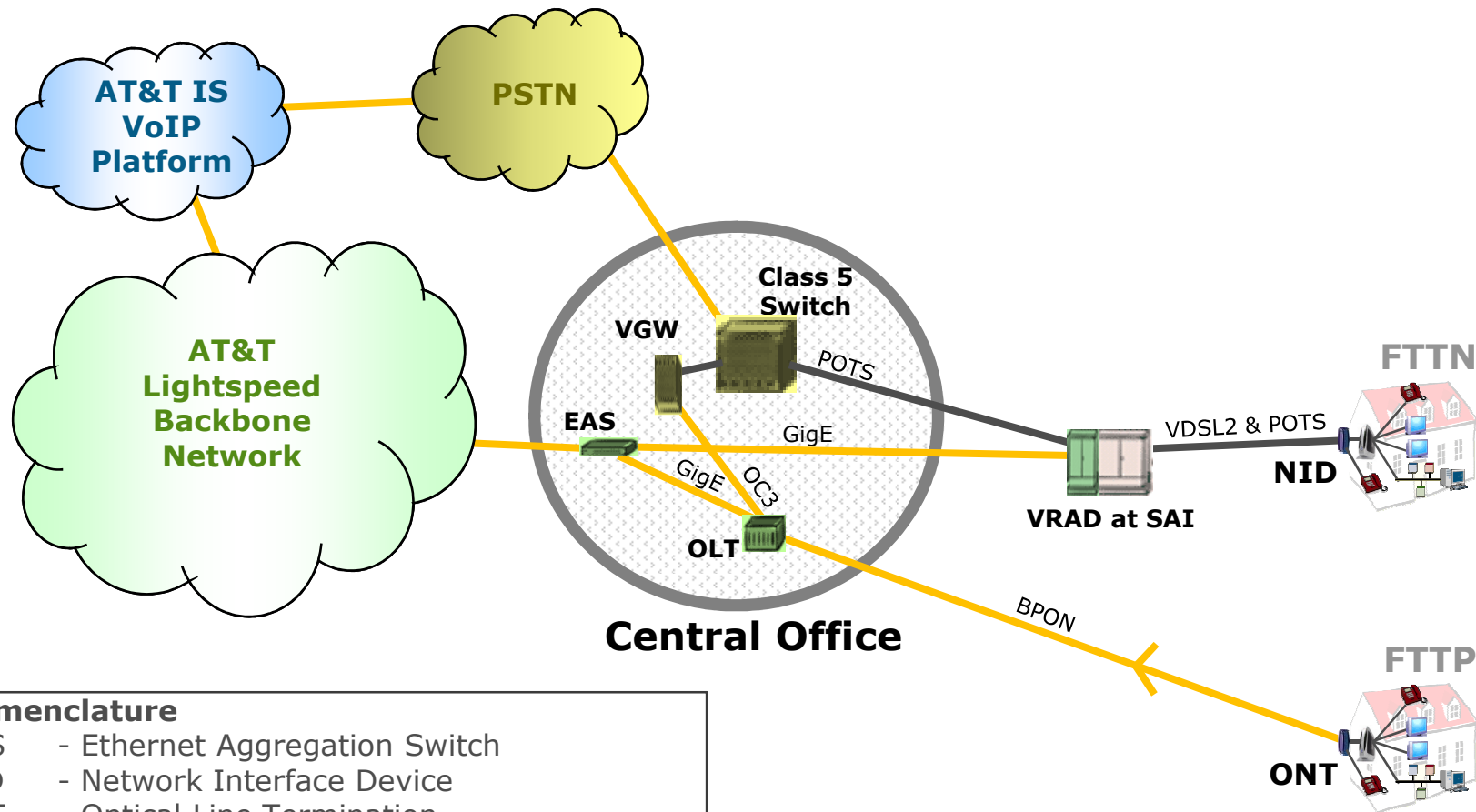


Agenda

- U-verse Voice Architecture
- Home Network
 - Home Network Architecture
 - Home Network Equipment
- Power Backup Requirements
- Power Backup in the Home

U-VERSE VOICE ARCHITECTURE

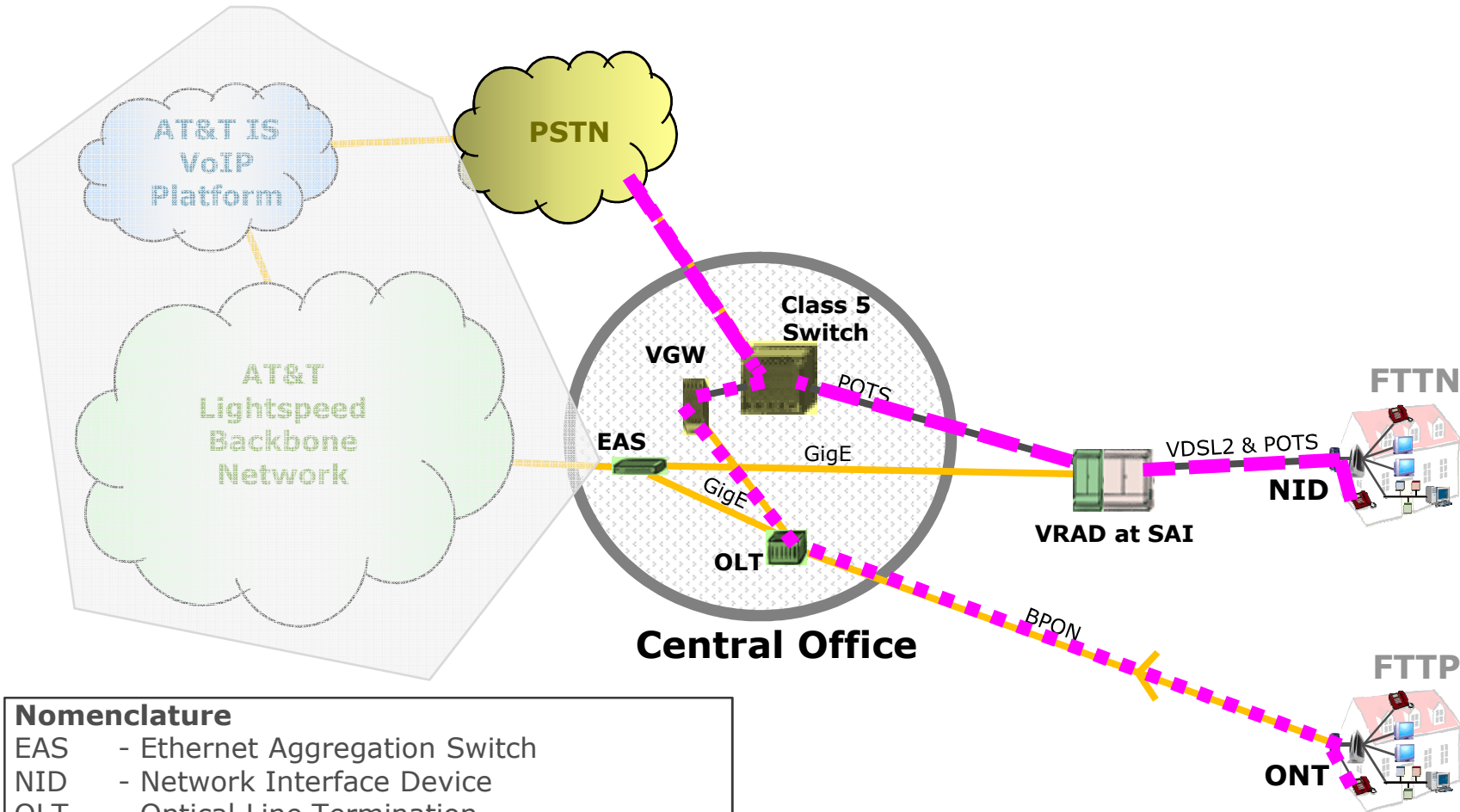
U-verse Voice Architecture



Nomenclature

EAS	- Ethernet Aggregation Switch
NID	- Network Interface Device
OLT	- Optical Line Termination
ONT	- Optical Network Termination
SAI	- Serving Area Interface (Cross Box)
VGW	- Voice Gate Way
VRAD	- Video Ready Access Device

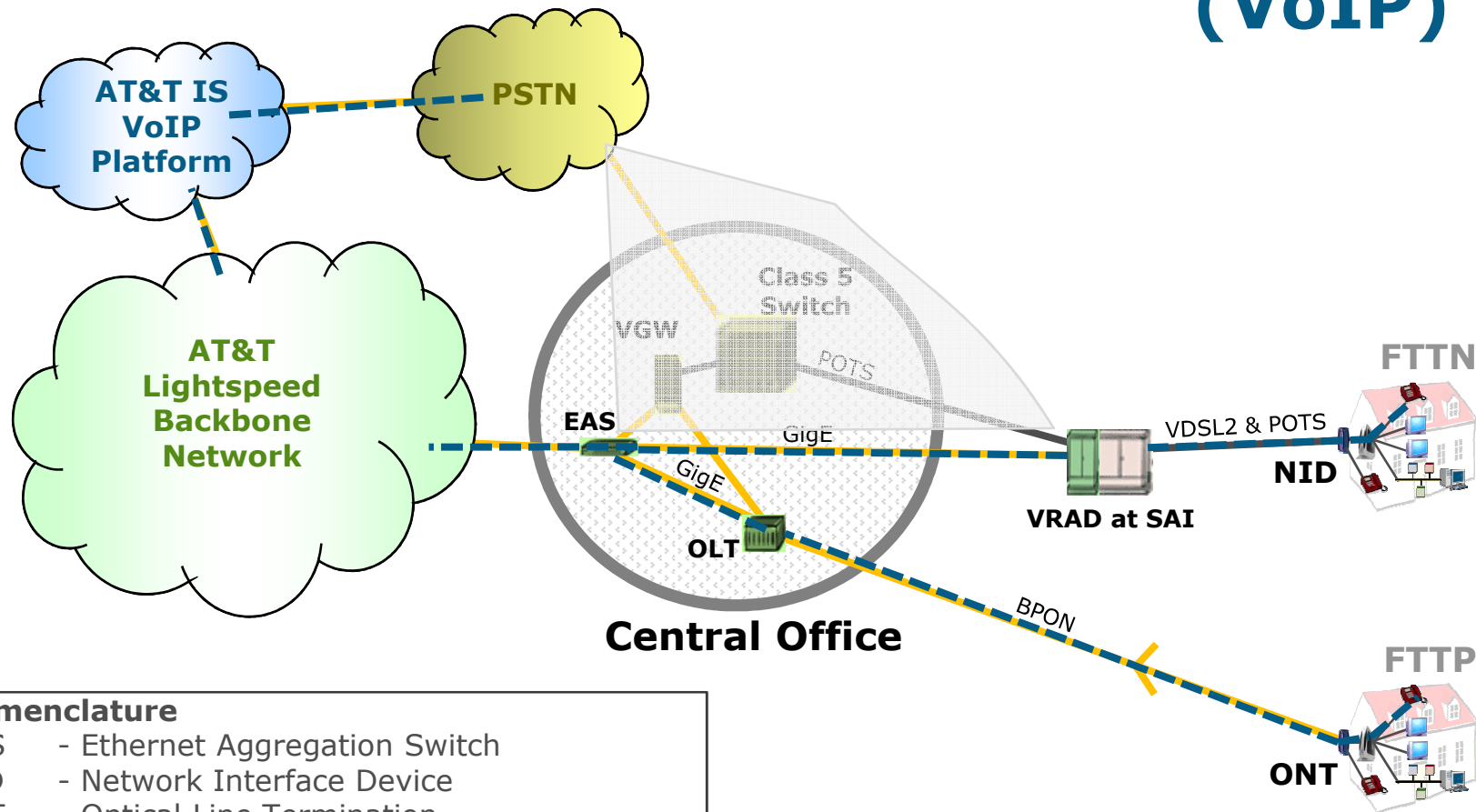
U-verse Voice Architecture - POTS



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U-verse Voice Architecture –U-verse Voice (VoIP)

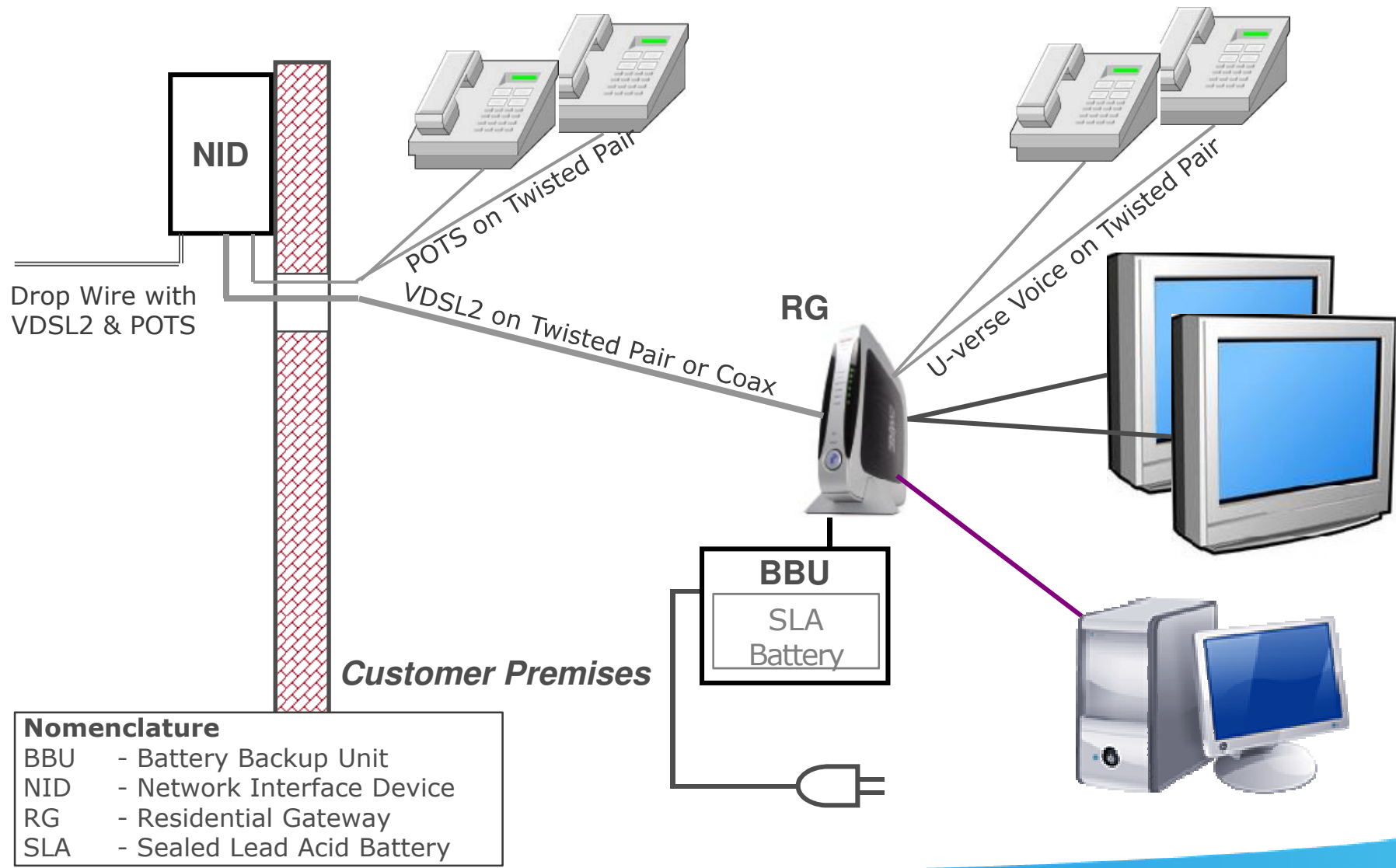


Nomenclature

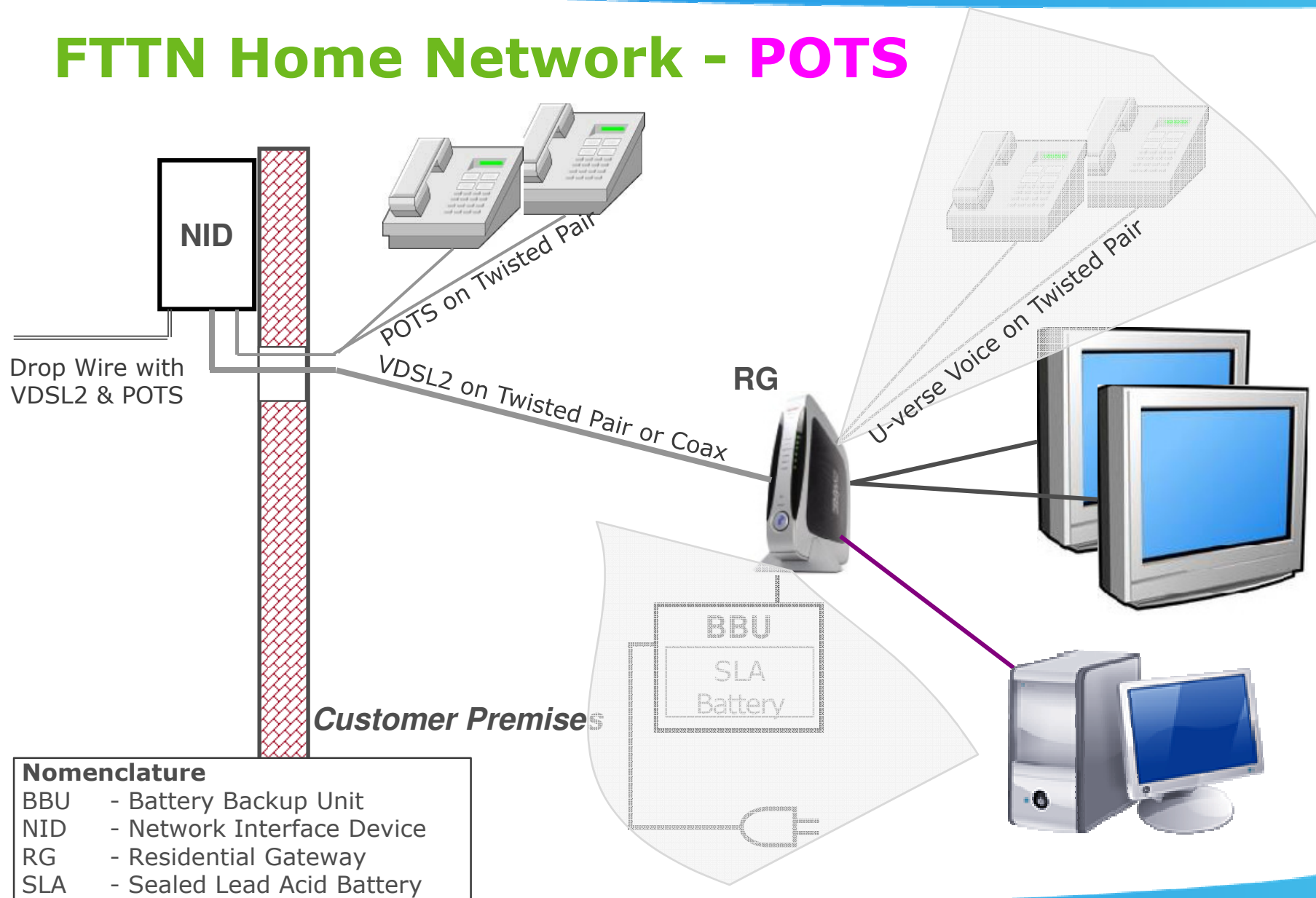
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U-VERSE HOME NETWORK

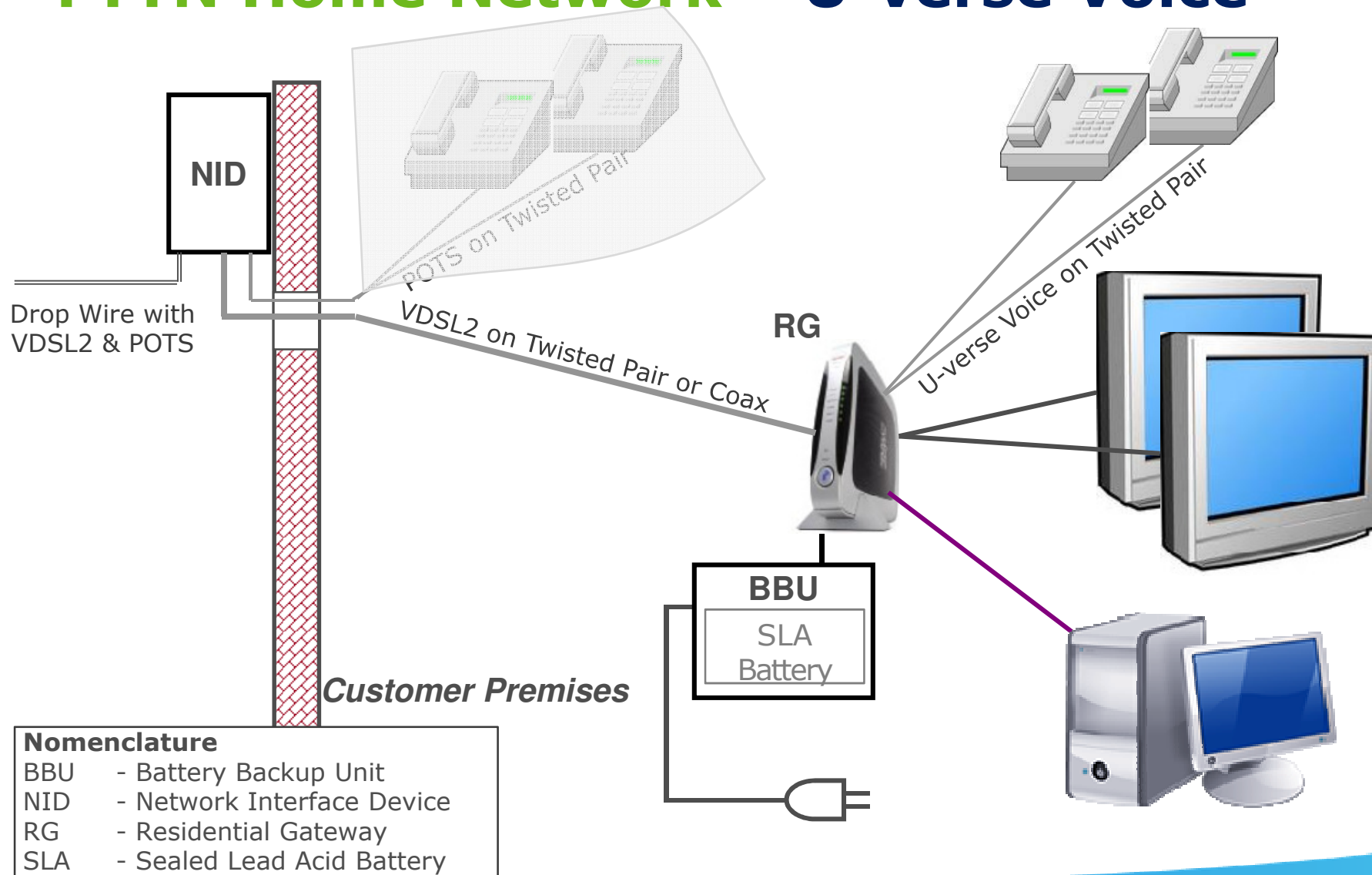
FTTN Home Network



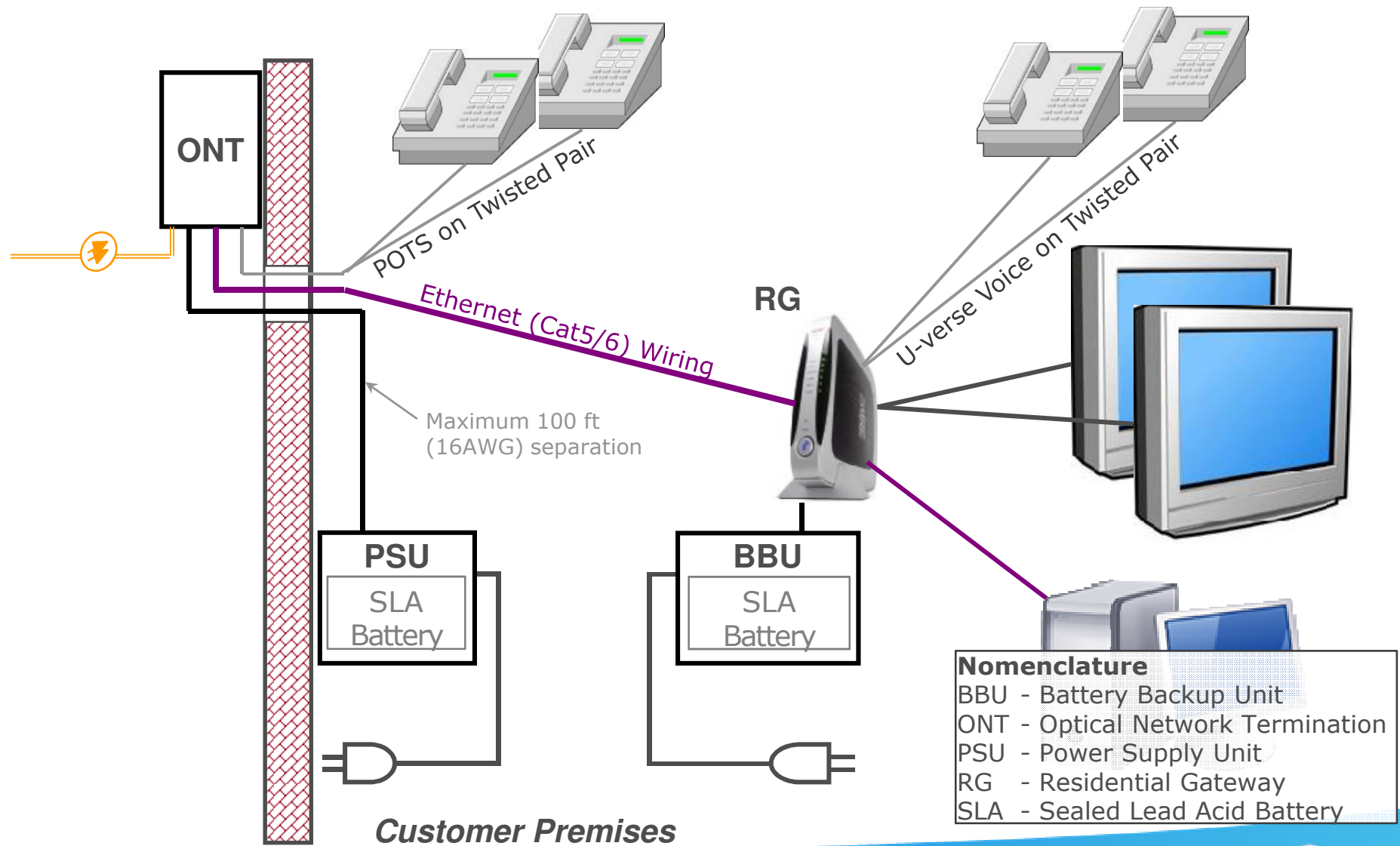
FTTN Home Network - POTS



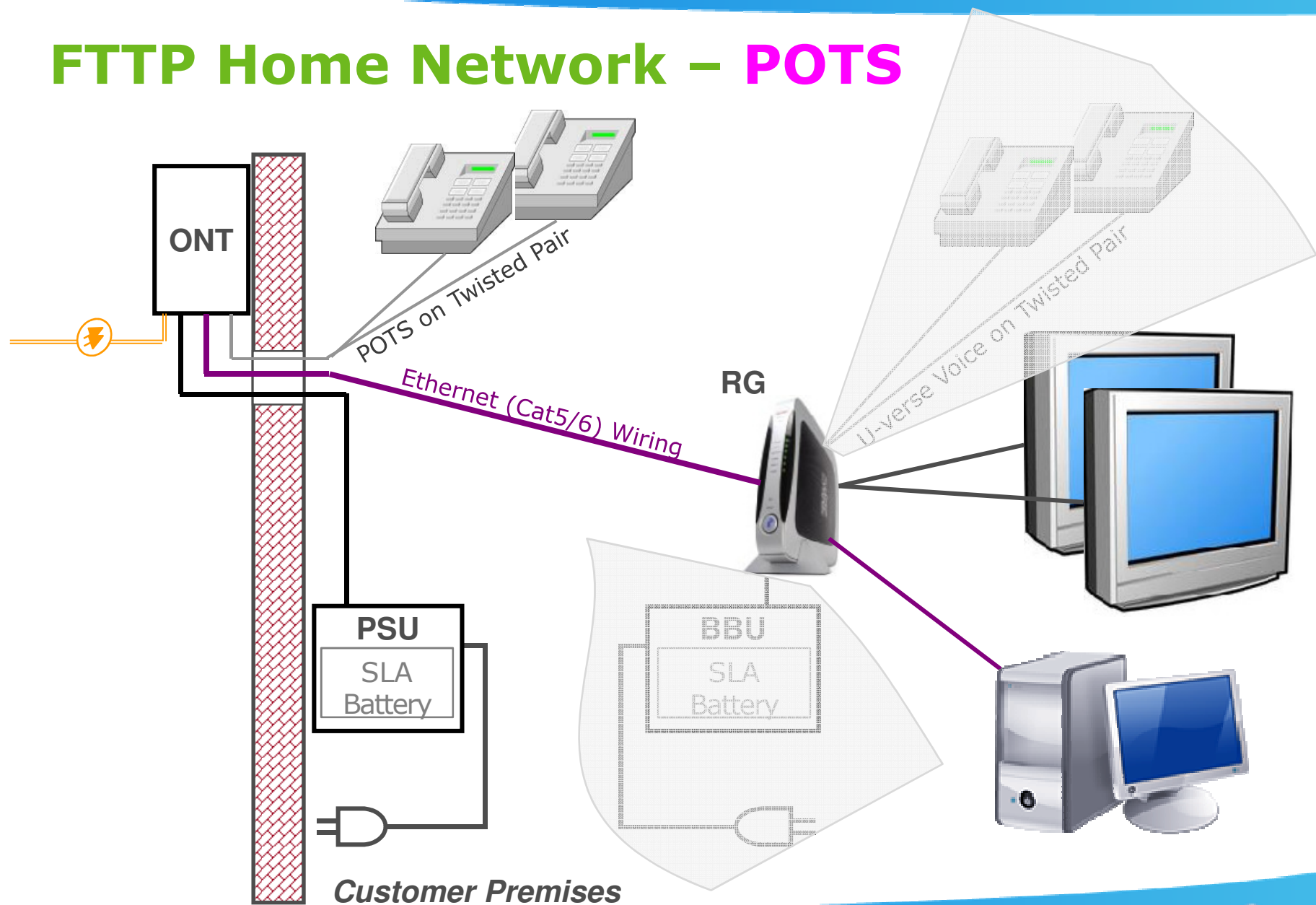
FTTN Home Network – U-verse Voice



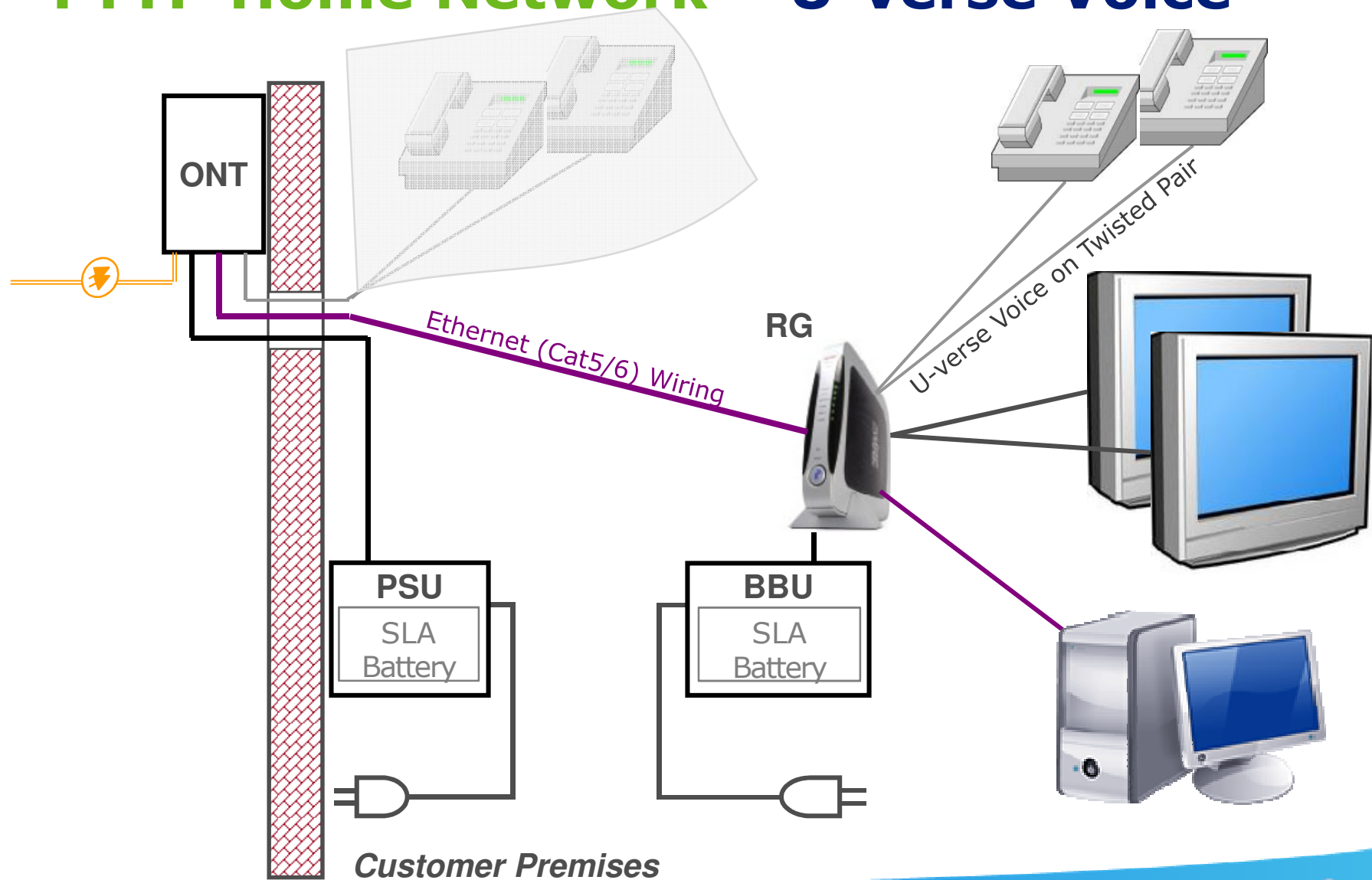
FTTP Home Network



FTTP Home Network – POTS



FTTP Home Network – U-verse Voice



Residential Gateway (RG)

2Wire 3800HGV



Technical Specifications

Broadband Interfaces

- VDSL2 for FTTN (RJ-11 or coax)
- Broadband Ethernet for FTTP (RJ-45)

LAN Interface(s):

- 4 Ethernet ports (RJ-45)
- Wireless 802.11g or HyperG access point
- USB 1.1 slave (PC/MAC connectivity)
- USB 2.0 host

VoIP

- 2 derived voice lines (RJ-11)

Power

- External 12Vdc power supply



RG Battery Backup Unit (BBU)

Belkin BU3DC000-12V



Technical Specifications

Electrical Specifications

- Input - 0 to 150Vac, 50/60Hz
- Output - 12Vdc (nominal), 30W maximum

Battery Type

- 12V, 7.2AHr, Spill-Proof, Maintenance-Free, Sealed Lead Acid (SLA)

Physical Specifications

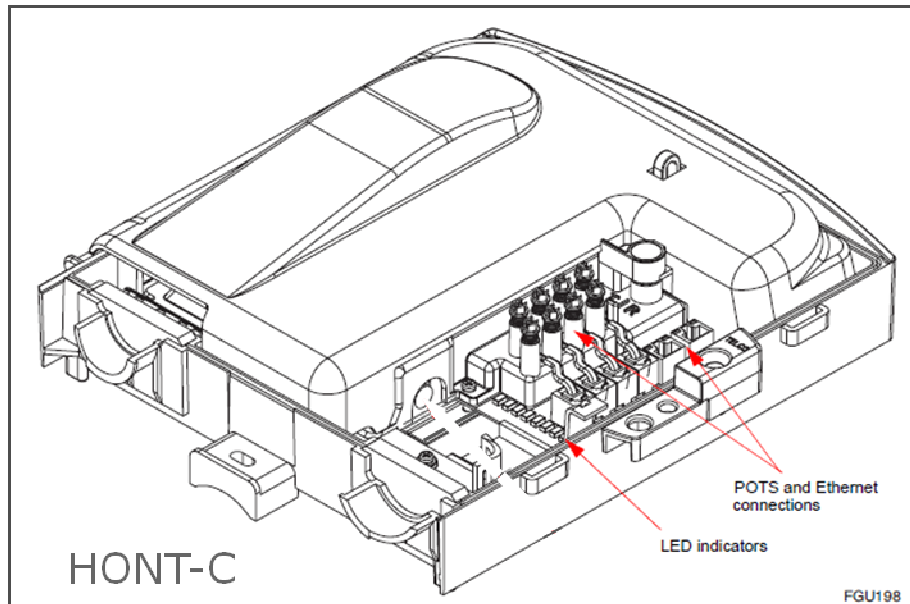
- WxHxD (in) - 3.5x8.3x7.8
- Weight - 7.1 lb (with battery)
- Input Plug - NEMA 5-15 plug, 6' cord
- Output Connector - 2.0mm DC pin, YSC 2700-013-25K, 6' cord

Features

- Visual and audible alarms - On AC, On Battery, Battery Low, Battery Missing, Replace Battery, Battery on Self-Test
- Audible alarm mute

Optical Network Termination

Alcatel-Lucent H-ONT



Technical Specifications

Broadband Interface

- BPON (APC optical fiber connector)

LAN Interface:

- 1 Ethernet port (RJ-45)

POTS Interfaces

- 4 analog voice lines (screw terminals and RJ-11)

Power

- External 12Vdc power supply (screw terminals)

Physical Specifications

- WxHxD (in) – 12x13.5x4.3
- Weight – 7 lbs

Features

- Hardened for outside use
- Visual status indicators: power, network, data, POTS, management

ONT Power Supply Unit

APC CP24U12D



Technical Specifications

Electrical Specifications

- Input - 90-240V, 50-60Hz
- Output - 12Vdc (nominal), 24W maximum

Battery Type

- 12V, 7.2Ahr, Spill-Proof, Maintenance-Free, Sealed Lead Acid

Physical Specifications

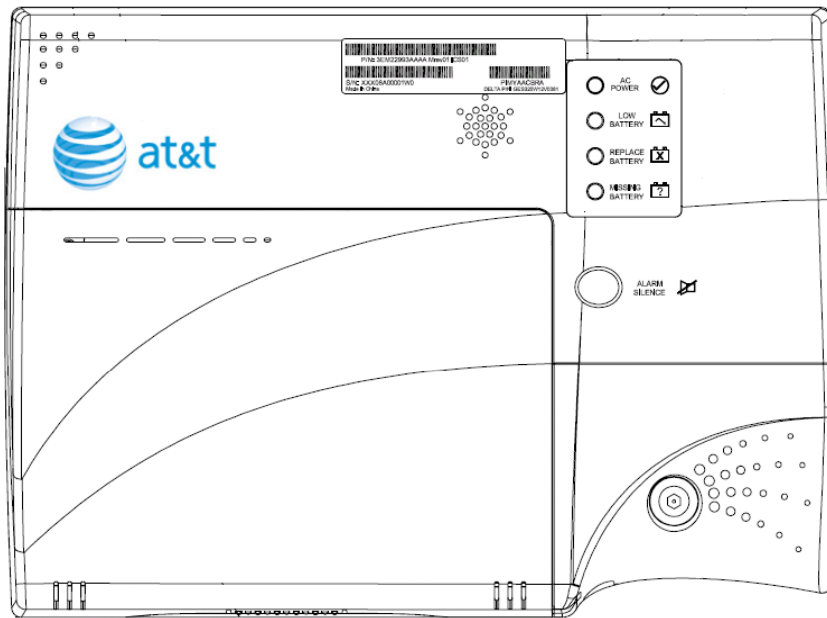
- WxHxD (in) - 9.5x7.5x3.1
- Weight - 7 lb (with battery)
- Input Plug - NEMA 1-15 cord, 6' cord
- Output Connector - 3.5mm, 7-pin screw-terminal connector

Features

- Visual and audible alarms - On AC, On Battery, Battery Low, Battery Missing, Replace Battery
- Audible alarm mute

ONT Power Supply Unit

Delta GES320W12V0081



Technical Specifications

Electrical Specifications

- Input - 100-240Vac, 50-60Hz
- Output - 12Vdc (nominal), 32W (maximum)

Battery Type

- 12V, 7.2AHr, Spill-Proof, Maintenance-Free, Sealed Lead Acid

Physical Specifications

- WxHxD (in) - 10.2x7.5x3.2
- Weight - 7.2 lb (with battery)
- Input Plug - NEMA 5-15 cord with 3-prong connector, 6' cord
- Output Connector - 3.5mm removable, 7 pin screw-terminal connector

Features

- Visual and audible alarms - On AC, On Battery, Battery Low, Battery Missing, Replace Battery
- Audible alarm mute

POWER BACKUP REQUIREMENTS

Commercial power reliability varies widely

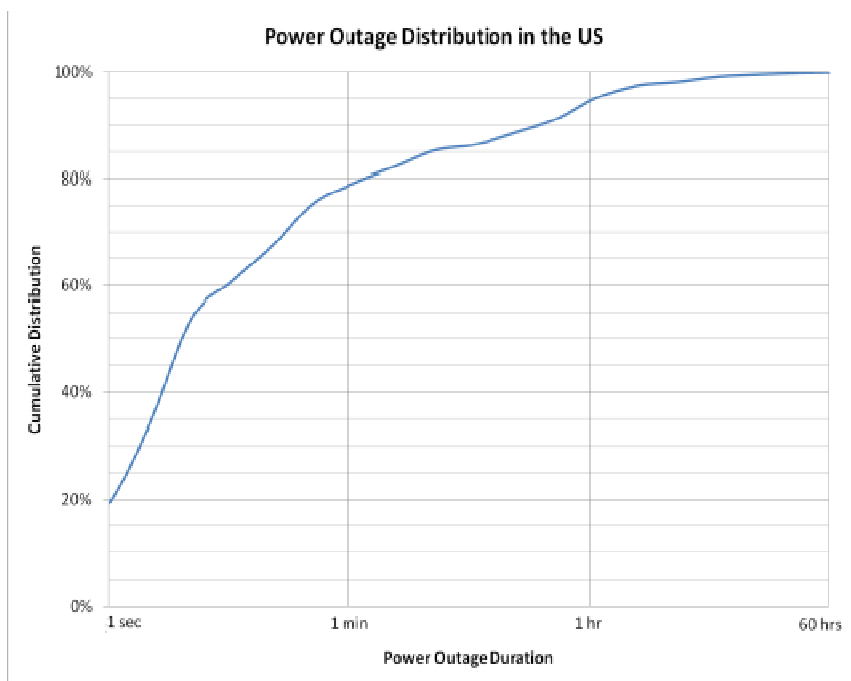
Number and duration of power disturbances &/or outages depend on a variety of factors, including

- Cause
 - typical electric grid “glitches”/faults are usually short duration
 - catastrophic events can cause long outages
- Power utility company
 - some are better than others
- Season
 - more outages occur in summer when demand is high

Commercial power reliability varies widely

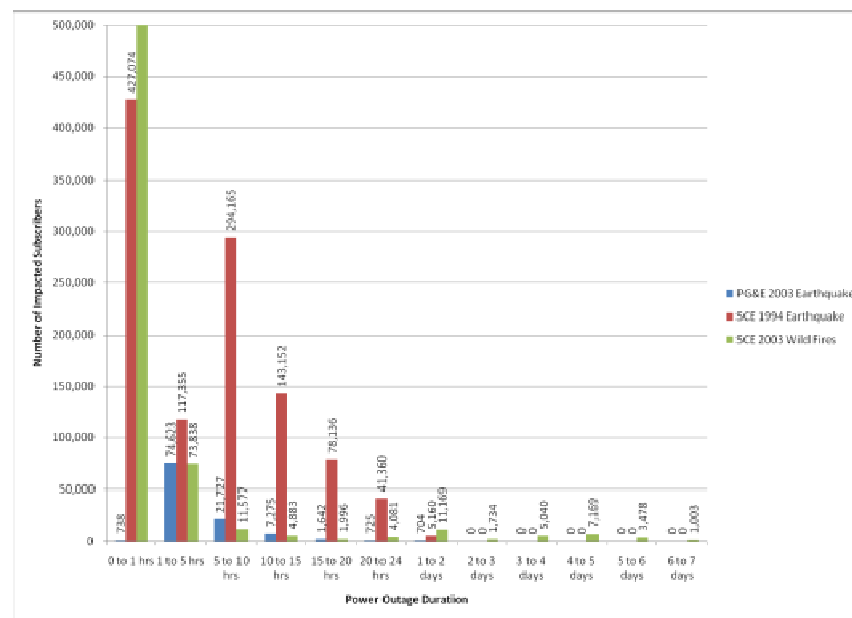
- **Grid power outages**

- 95% of all outages last less than 86 minutes
- *98% of all outages last 4 hours or less*

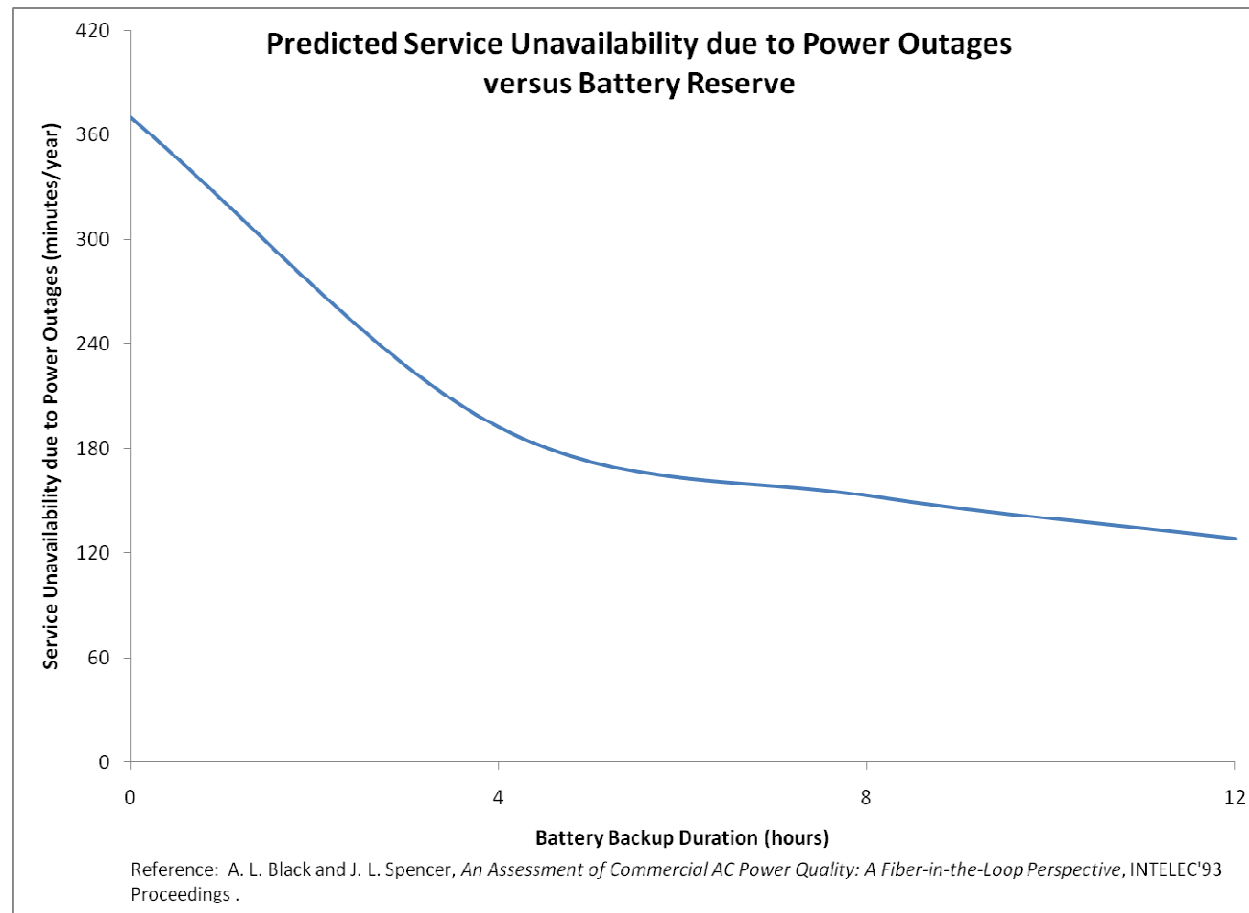


- **Long-duration outages**

- Are a very small percent of all power outage events (<0.05%)
- Are typically caused by widespread, catastrophic events (e.g., hurricanes, winter storms, earthquakes, wild fires)



Power Backup Requirements



POWER BACKUP IN THE HOME

Battery Backup Duration

Battery backup *duration* generally depends on:

- Power use of the equipment:
idle power + incremental service power
- Distance of the equipment from the battery (power line resistance)
- Temperature of the battery
- Age of the battery
- Quality/design of the battery
- Manufacturing variations

Power Backup in U-verse

- FTTP
 - POTS voice requires ONT backup power during power outages.*
 - U-verse voice requires both ONT and RG battery backup power during a power outage.*
- FTTN
 - POTS voice requires no power backup in the home during power outages.*
 - U-verse voice requires RG battery backup power during a power outage.*

*Additionally, if customers' telephone equipment requires power, *i.e.*, cordless phones, a separate power backup device is required for this equipment; the ONT/RG batteries do not provide power for cordless phones.

Power Backup in U-verse

- FTTP ONT Backup
 - A battery is provided with the initial FTTP installation. An operational battery will keep the service working for up to eight hours in the event of an outage.
- FTTP/FTTN RG
 - A BBU and new battery are provided with the VoIP service installation. Typical backup time for the battery is four hours with a new, fully charged battery (which meets Belkin battery recommendations), with one corded single-line, touchtone phone connected to the RG, and with no other equipment and no service other than AT&T U-verseSM Voice drawing power from the RG Battery Backup.

GLOSSARY

Glossary

BBU	- Battery Backup Unit	PSU	- Power Supply Unit
BPON	- Broadband-capable Passive Optical Network	RG	- Residential Gateway
EAS	- Ethernet Aggregation Switch	SAI	- Serving Area Interface (Cross-Connect)
FTTN	- Fiber to the Node	SLA	- Sealed Lead Acid
FTTP	- Fiber to the Premises	VDSL	- Very high bitrate Digital Subscriber Line
GPON	- Gigabit Passive Optical Network	VoIP	- Voice over IP
IP	- Internet Protocol	VGW	- Voice Gate Way
LAN	- Local Area Network	VRAD	- Video Ready Access Device
NID	- Network Interface Device		
OLT	- Optical Line Termination		
ONT	- Optical Network Termination		
PC	- Personal Computer		
PON	- Passive Optical Network		
POTS	- Plain Old Telephone Service		
PSTN	- Public Switched Telephone Network		